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THE METAL INDUSTRY

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A TRADE JOURNAL RELATING TO THE NON-FERROUS METALS AND ALLOYS.

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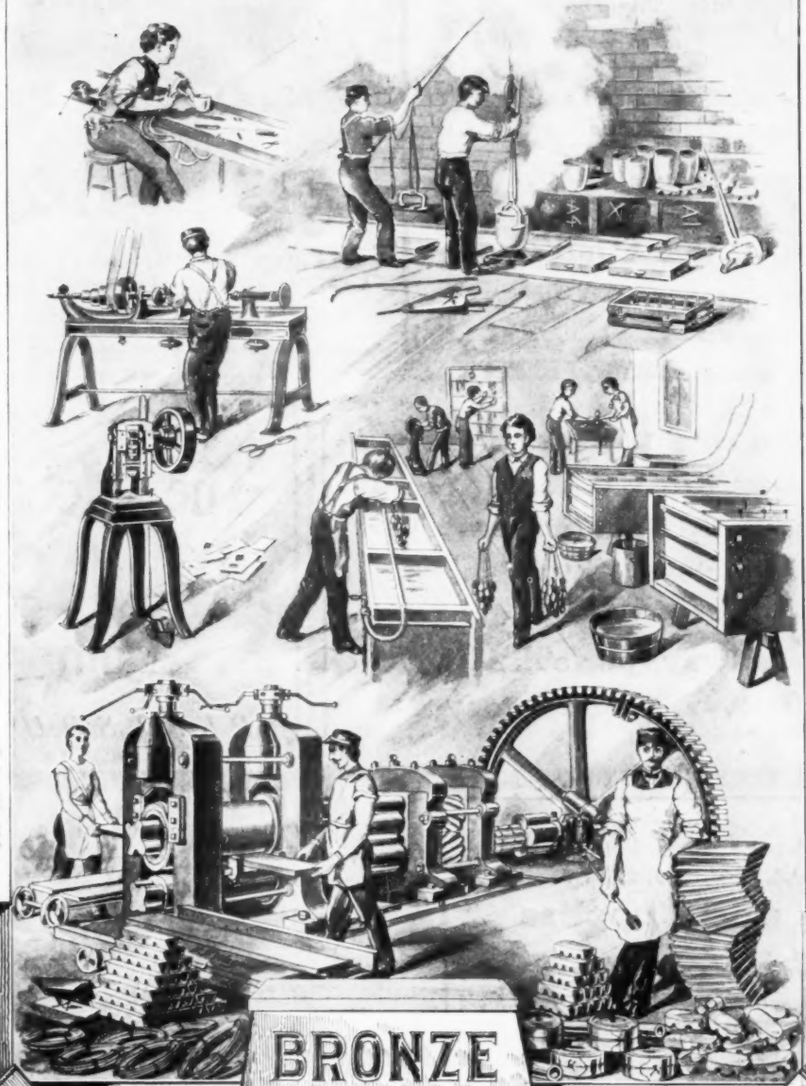
METALLOGRAPHY · BRASS · METALLURGY



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BRONZE

OLD SERIES Vol. X. No. 3.
NEW SERIES Vol. II No. 3.

MARCH, 1904

LABOR OMNIA VINCIT

NEW YORK.

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PUBLISHED MONTHLY BY

The Metal Industry Publishing Company

(Incorporated)

61 BEEKMAN STREET, NEW YORK

PALMER H. LANGDON, ... *Publisher*
ERWIN S. SPERRY, ... *Editor*
JOHN B. WOODWARD, ... *Director*

Subscription Price $1.00 per year, postpaid to any part of the world. Single copies, 10 cents.

ADVERTISING RATES ON APPLICATION.

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Entered February 10, 1903, at New York, N. Y., as Second Class Matter Under Act of Congress March 3, 1879.

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THE FINENESS OF GOLD JEWELRY.

A bill known as the Bostwick bill has been brought before the Assembly of the State of New York for the purpose of making it obligatory upon the manufacturer of gold jewelry to stamp the actual fineness upon the article instead of any fineness that the caprices of the manufacturer may dictate. The bill is said to be aimed particularly at the manufacturers of 10-karat goods, who have the practice of stamping their ware as 14-karat. These manufacturers claim that the 10-karat article is far more durable than the 14-karat, but that it is necessary to dispose of it under the guise of being 14-karat.

Some time ago similar agitation was brought about in regard to the manufacture of sterling ware, and has resulted in the enacting of laws in certain states which compel the manufacturer to produce an article 925 fine if it is so stamped. It is to be regretted that only a few states have passed such a law, but it appears to have resulted in preventing much of the spurious silverware being placed on the market as the maker is limited in his territory in which he can sell it. While we appreciate that the enacting of the Bostwick bill will work hardships upon the maker of low-grade jewelry, we believe that it will produce the same condition of affairs which now exist in the sterling silver trade. It is certainly no more injustice to make the gold manufacturer produce goods of the fineness that is marked upon them than it is to force the sterling silver maker to do so.

Several arguments are brought up against the passage of the bill. One that it will enable manufacturers of other states to flood the market with cheap goods. Second, that articles made from gold of different degrees of fineness, such as, for example, a watch chain, which may be partly of 14-karat and partly of 10-karat, cannot be properly stamped. The first argument is certainly a strong one, and we believe that the enactment of the law by the State of New York will result in a hardship to the manufacturer of this State. The law, in order to be indiscriminate, should be passed by other States in the same manner as the laws regulating the manufacture and sale of sterling silver. The result would then be the same. As far as the manufacture of goods of varying karat is concerned, we would suggest that the goods be stamped with the designation of the two karats, as there appears to be no objection to it. The user of jewelry is usually not exacting in this re-

spect, and his only requirement is that the material shall be solid. He is fully cognizant of the fact that a red gold contains less pure gold than one which is yellow.

The enactment of a law of this description will certainly work advantageously toward the maker of high grade jewelry, and likewise with the consumer. We believe that stamping goods with a designation which they are not can hardly be called a laudable practice.

DANGERS OF ENAMELLED WARE.

Much discussion is now taking place in England about the dangerous qualities of enamelled cooking utensils. The commencement was made in the medical journals, but trade papers are now beginning to take up the subject. The danger is supposed to exist on account of the freedom with which enamelled ware cracks and scales, and so produces splinters or "detached spiculæ," as our English friends call them. These spicules get into the family intestines and cause appendicitis, or other similar troubles. One medical practitioner is so impressed with the importance of the argument that he says that he has *given away* all of his enamelled cooking utensils.

Several of the English trade journals, which are apparently not in favor of enamelled ware, have taken it upon themselves to test some samples of cheap enamelled ware. Water quickly evaporated to dryness in a skillet gave a large number of these glassy flakes, which would certainly cause trouble if taken into the stomach. Whether all enamelled ware is subject to this scaling is not clear, but the English journals are positive that it occurs with the cheap classes of goods.

Enamelled ware has always been a subject of more or less discussion, first on account of its content of lead, arsenic, or other poisonous substances, and now about the splinters. We must lay aside all skepticism and inclination to look at the matter lightly, however, as the subject is a serious one. The enamel, especially in the case of cheap enamelled ware, is quite brittle in nature and is undoubtedly easily scaled or splintered. If this occurs during the operation of cooking food, the detached splinters of enamel must certainly find their way into the stomach of the person who is unfortunate enough to eat it. The dangerous qualities of glass when it is taken into the stomach needs no argument for its support. Many persons have lost their lives through the intentional mixing of glass with their food, and many celebrated trials for murder have brought to light the fact that the suspected person well knew the dangerous properties of such an admixture. We actually believe that many cases of intestinal troubles have been caused by the particles of enamel which have become detached from utensils during the food-cooking process. How extensively such a difficulty exists we cannot say, but as forewarned is to be forearmed, it is certainly good policy to investigate the subject.

This agitation should react favorably for the manufacturers of aluminum ware, for there is certainly no danger in its use. Of course, cost is largely in the favor of cheap enamelled ware, but the long life of aluminum ware is quite alluring, and it is doubtful whether, if everything is taken into consideration, that good aluminum cooking utensils are not actually the cheapest in the end.

BRASS FURNACE ASHES.

A reaction is apparently about to take place in the manner of reclaiming brass furnace ashes. There is certainly a need for it. In the early days of the brass industry the ashes, after the large pieces of metal had been picked out by hand, were thrown on the dump and, we regret to say, that some brass manufacturers still carry out this antiquated method. As profits become smaller the manufacturer began to look for the leaks and the furnace ashes were found to be one of them. Stamps were introduced in many mills for the purpose of crushing the coal, cinders, and slag, and by means of a stream of water the foreign matter (together with most of the fine metal) was washed away. Many of the early dumps have proven veritable gold mines for enterprising people who had the wisdom to put modern washing appliances on the spot and reclaim the refuse, and there are undoubtedly many more of them around the country which would yield the same profit were it possible to uncover them so that they could be worked.

As time went on the Chili mill began to be used and much greater economy was found over stamps, although for hard slags the stamps were still employed. Again competition forced greater economy and the Hill barrel now made its apearance and has replaced the Chili mills to some extent, although they still leave much to be desired. That the Hill barrel is wasteful of metal is evidenced from the fact that the tailings from it will show from four to six per cent. of copper and this with even the best practice. Up to this time, however, it is the best form of apparatus known, as the grinding takes place by the process of attrition, while that of the Chili mill is one of actual crushing and particles of metal existing under the rotating wheels will effectually prevent the crushing of slag or cinders which are present with them.

The whole problem of reclaiming brass furnace ashes seems to lie in some method which will remove the metal in a better manner than is now done. In the Hill barrel the fine metal is either washed away by the stream of water which is used or sucked out by the current of air if the dry process is employed. It is the metal in these tailings that should be recovered, and tons go to waste in this manner. The question resolves itself into two parts. First, to carefully grind the ashes in a fine state without loss and then by a system of concentration separate the metallic from the non-metallic particles. After the material has been ground to the proper fineness the concentration is a simple ore proposition and is practiced every day with gold, silver, copper or other ores. The difference in specific gravity between the metallic and non-metallic particles renders the operation a simple one. The difficult problem in connection with such a process for reclaiming brass furnace ashes is the matter of grinding and some better form of appliance than the Hill barrel is needed for economical working.

In connection with these comments on the state of the art of ash reclaiming, it may be of interest to say that a certain brass mill has already taken up the question along these lines and is able to wash brass furnace ashes so that the tailings show less than one per cent. of copper.

CLOSE PLATING AND ITS METHOD OF MANUFACTURE

By J. Le Roy Brown.

While electro-plating is of comparatively recent origin, the art of close-plating long antedates it, and was carried on hundreds of years before electro-plating was discovered. Close-plating was the first form of plating practiced and is, undoubtedly, one of the ancient arts. That close-plating should have survived the inroads of progress is remarkable, but it is nevertheless the fact that for certain forms of work close-plating gives results far more durable than can be obtained by the best electro-plate. It is for this reason that close-plating has survived, and is yet carried on by quite a number of establishments which also do electro-plating work.

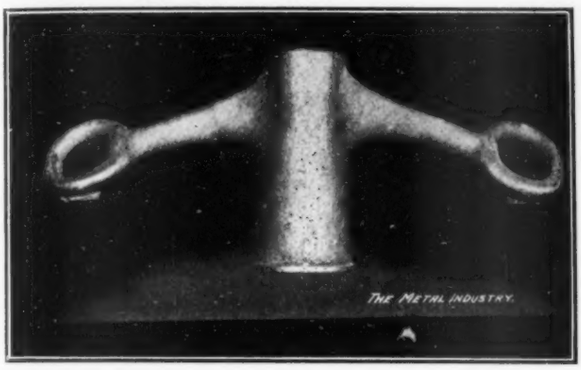


FIG. 1.—MALLEABLE IRON POLE—CRAB CASTING.

Strictly speaking, *close-plating* is the process of soldering a sheet of one metal on another. The base metal is generally iron or other cheap metal, while the sheet metal that is soldered is put on for the purpose of protection and ornament. In the early history of close-plating it was practiced upon spoons, forks, ladles and similar utensils, and many examples of such wares are yet in existence. At the present time, however, close-plating is almost entirely confined to harness and carriage trimmings, as this class of goods seems to demand it more than any other. In the early days people were accustomed to purchase close-plated goods when solid silver could not be afforded, and it bore the same relation to sterling silverware that plated goods do at the present time. In nearly every class of goods electro-plate has driven out close-plated ware, but in the manufacture of harness and coach hardware close-plating still survives.

Let us select for an example of close-plating a pole-crab, an article with which nearly everyone is familiar. It is the appliance which exists on the end of a carriage pole and answers to hold back the vehicle on a hill or other incline. A neat equipment demands that the pole-crab, as well as the remainder of the harness furniture, shall be of polished metal, and as this appurtenance is one which must necessarily be very strong, the metal from which it is made is generally steel or its equivalent. Now iron rusts so easily and possesses such an unpleasant color that to leave it bright would be out of the question, so the crab is plated with brass or silver as the customer wishes. If a steel crab is plated by the electro-plating process there results a very unstable coating. Perhaps the time will come when a durable plate may be obtained on iron, but it has not yet arrived. It is for this reason that the pole-crab is close-plated.

Taking for an example the pole-crab, let us assume that it is to be plated with silver, as this metal is used more extensively than brass for close-plating. The crab is made of a steel forging, malleable iron, or steel-casting. It matters not which it is, the process of close-plating is the same. In the one which we have taken for an example the crab is made of a malleable iron casting. This crab is shown in Fig. 1. The first thing to do is to give the casting a good pickle to remove any sand or slag which may adhere to the surface. Hydrofluoric acid is an excellent pickle, as it attacks the sand directly. After the pickle, the sprues and other imperfections, such as fins or lumps, must be ground off on an emery wheel.

The next step is to smooth down the surface, so that there are no ridges or hollows, but the whole exterior is in such a condition that the sheet of silver will lie perfectly flat when it is attached to the casting. Much depends upon the thoroughness of the operation. If care is not taken a good job cannot be done. After the grinding on the emery wheel is finished, the surface is ground on suitable wheels or strapping belts until a fine finish is produced. The final finish is given with No. 90 emery, either on a strapping belt or canvas wheel to which the emery is glued. These points are left to the operator, as some prefer other kinds of wheels. The main object, however, is to obtain a smooth surface. In Fig. 2 is shown the crab after this operation.

After the smoothing process has been done, a surface is produced which is too smooth for the solder to adhere closely, and for this reason it is now gone over with coarse emery cloth so that a series of checkered markings are produced. This does not interfere with the flatness of the previous grinding, but renders the surface sufficiently rough to make the solder stick very tightly.

The next operation is the "tinning," that is, the covering of the entire surface of the casting with solder. Although this operation is called "tinning," the term is applied to covering any surface with solder or tin. I presume that the term originated because tin was thought to be the only material which would cover it, but solder answers equally as well, as it covers the surface nicely and is much cheaper than pure tin. A solder composed of two parts of tin and one of lead is used for the work.

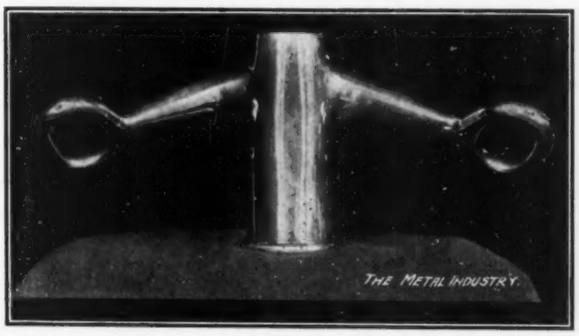


FIG. 2.—AFTER STRAPPING.

The crab is first coated with flux made by dissolving zinc in muriatic acid and then dipped in an iron kettle filled with the molten solder. The excess of solder is now "mopped" off until the surface has the appearance of that shown in Fig. 3. Now herein lies a very critical operation. If the sheets of silver are to be "soldered on" (*i. e.*, the whole surface heated over an open fire, and the solder melted so that the silver becomes soldered all at once) the surface of the crab does not need to be "mopped" as dry as it is when the silver is to be "ironed" on (*i. e.*, ironed with a soldering iron, as will be explained later). At any

event a good job must be done, as otherwise the final result will not be satisfactory. Lumps or ridges cannot be tolerated.

The crab is now ready for the plating. Pieces of close-plater's silver (described subsequently) are cut from the roll purchased from the manufacturer and annealed by holding over a Bunsen burner. The side which is exposed to the flame is put on the outside of the crab, as it is not so apt to stick to the solder as the other. The pieces of silver are now cut so as to cover the surface as

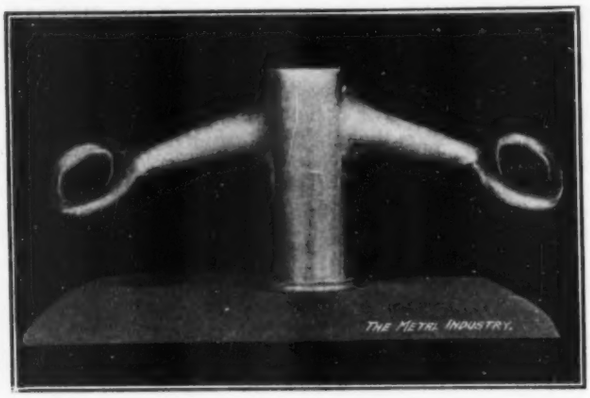


FIG. 3.—AFTER TINNING.

fully as possible and with as few joints. Of course, in an article like a pole-crab it is impossible to cover the surface with one piece, so there must necessarily be several joints. These joints are matters which require very great care, and a good close-plater will make an almost invisible joint. The silver is previously cut so that the joint will be as close as possible without overlapping. This is a matter upon which the skill of the close-plater is displayed and one that requires judgment.

After the silver has been cut, the operation of "ironing" it on is begun. In Fig. 4 the pieces of silver, cut and ready to be "ironed" on, are shown. The operation consists of soldering the silver down to the casting by means of a soldering iron, covered with lard oil, so that it will slip over the surface of the silver sheet and not scratch it. Now certain classes of work are only "ironed" on, but in the best classes of goods an additional operation is put upon them after beong "ironed"; that of "soldering-on," as it is called in close-platers' parlance. This process is carried out as follows, viz.: After the sheets of silver have been "ironed on" so that every portion of the silver, as far as possible, adheres to the crab, the whole is covered with the best quality of lard oil and heated over an open coke or charcoal fire until the oil begins to turn brown, indicating that the temperature is sufficiently high to insure the solder becoming liquid. The whole crab is now taken to a vise, held firmly, and the sheets of silver pounded down on the casting with greased rags. This operation is simply one of forcing the silver down into intimate contact with the surface of the castings, so that no part remains unsoldered and the whole is perfectly tight. The whole surface of the silver is now rubbed carefully with a dead-smooth file, upon which the teeth have been nearly ground out. The surface is kept covered with lard oil, so that no scratching will take place. The object of this process is to discover any places which are not tight. If any blisters are found, indicating air underneath the silver, they are pricked with a sharp knife and the metal "ironed" down. This now finishes the close-plater's job.

The crab is now finished as far as the close-plater is concerned, but is not yet completed. The superfluous solder which existed underneath the silver has oozed or sweated out when either the "soldering-on" and the "ironing-on" has taken place and has covered the surface in many places. Now this solder must be removed and the operation of doing it is very critical and requires exceptional care, otherwise the thin sheet of silver is liable to be cut through in the buffing. Although the operation of removing this superfluous solder is only one of buffing, there is not one buffer in ten who can make a good job. Only men experienced in such work can be put on a job of this nature. The buffing is performed on rag wheels, first with tripoli until all the other solder has been removed (the fact that the solder has been removed can only be told by the eye) and lastly "colored" on another rag wheel with rouge. Great care is necessary in these operations to keep grit away, as otherwise deep, unsightly scratches will be made. Separate stands, wheels, and other appliances should be kept exclusively for this class of work. The crab is now finished and is shown in Fig. 5. A pole-crab such as is here shown sells, when partially close-plated (i. e., only the exposed portions covered as this is all that is required), for about $2.00, and it is doubtful, were it possible to do as good and lasting a job with electro-plate, whether the cost could be kept as low.

The quality of the sheet silver which is used for close-plating is quite important, and a good job cannot be done unless the sheet is soft and free from imperfections. Sterling silver will not do, as it is not sufficiently soft to remain where it is put. The silver used, therefore, is almost chemically pure, and is what is known as "Fine-Silver," and runs over 999 parts of silver per thousand. It is what is called 999 fine, and is the purest silver that can be purchased. Among the trade, the sheet which is used for plating is known as "Close-platers' silver," and is made by rolling a plate of the above mentioned silver cast in an iron mold to very thin sheet. The plate which is rolled has the dimensions of 6½ in. by 12 in. and 1 in. thick. This plate is rolled until it becomes necessary to anneal it, and after this operation it is again rolled until another annealing is required, and so on. The sheet is finally rolled to a thickness of .0005 to .001 of an inch, scarcely more than the thickness of thin paper. The silver is left "hard rolled" when it is shipped to the close-plater,

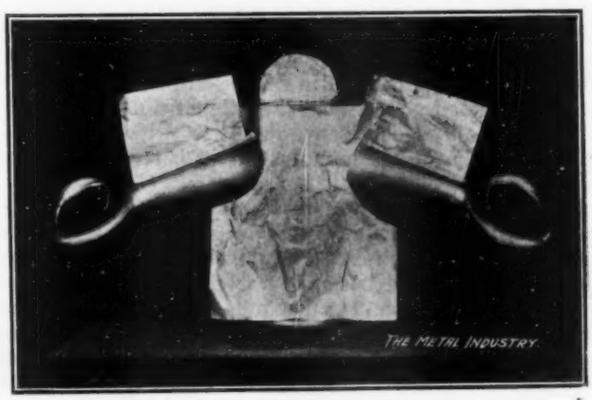


FIG. 4.—READY TO "IRON ON."

as he prefers to anneal it himself. This annealing of thin sheet silver is difficult to perform in the roll, as the thin sheets are liable to adhere to one another. It is better for the sheet silver manufacturer, therefore, to have the close-plater anneal it himself. In this way all buckled or cracked sheets are obviated, as there is no liability of this difficulty taking place when the sheet is shipped hard.

Close-plater's silver is not sold by the same rules as brass or similar close-plater's metal, but is indicated by the following numbers, viz.:

Table of Weights of Close-Plater's Silver.

Number.	Weight of 1 foot.	Number.	Weight of 1 foot.
1 Fair	2½ dwt.	2½ Fair	9½ dwt.
1½ Light	3 dwt.	2½ Stout	10½ dwt.
1½ Fair	3½ dwt.	3 Light	11½ dwt.
1½ Stout	4½ dwt.	3 Fair	12½ dwt.
2 Light	5½ dwt.	3 Stout	13½ dwt.
2 Fair	6½ dwt.	3½ Light	14½ dwt.
2 Stout	7½ dwt.	3½ Fair	15½ dwt.
2½ Light	8½ dwt.	3½ Stout	16½ dwt.

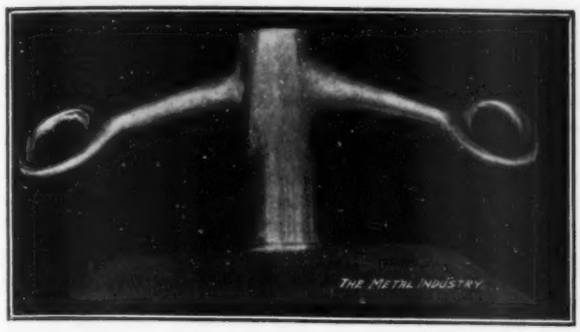


FIG. 5.—FINISHED CRAB.

The size—3½ Stout is also known as extra heavy or door knob silver. The sizes that are mostly sold are the No. 2 Fair and the No. 2 Stout.

The classification of these sizes is determined in the following manner: A sheet six inches wide and one foot long is cut from the sheet and weighed upon delicate balances; the weight in pennyweights determines the number. For example, a sheet of No. 2 Fair of the dimensions of 1 foot long and 6 inches wide weighs 6½ pennyweights. A sheet six inches wide is always used for standard. The custom of rolling the silver six and one-half inches wide has recently come into practice, the trade appearing to demand it; but for determining the number it is invariably trimmed to six inches in width before weighing. Such a piece of the dimensions used for weighing is called a "square," and is standard practice in the determination of the gauge.

The amount of brass close-plating that is done is inconsiderable when compared with silver, as solid brass articles are very cheap at the present time. There are many uses, however, where steel is necessary, but upon which a coating of brass is desired. Brass plate is quite unsatisfactory upon steel as far as the wearing qualities are concerned, and for this reason many articles are close-plated with brass sheet. Among these are the pole-crab when a set of brass harness equipment is desired and recent uses are in automobile work such as the levers or other attachments, which must be made of steel and upon which a non-corrosive covering is desired. Brass sheet used for close-plating is known as "Plater's Metal," and in the language of the brass rolling mill, sheet thinner than No. 38 B. & S. gauge is within this category. The brass is annealed before it goes to the close-plater instead of being left hard-rolled as silver is.

The method of close-plating with brass or similar metals is the same as that of silver up to the time that the sheet begins to be attached to the crab. Here a slight change is made. The brass sheet is tinned by first dipping in the acid flux previously mentioned, and introducing into the tinning bath (melted solder). The sheet is then mopped off and the surface gone over with a tool similar to a large flat soldering iron and which is heated so that the solder will melt. The surface is accordingly smoothed down, so that only a very thin coat of tin is left on the brass, and that is perfectly smooth. This sheet of brass, tinned on both sides, is now "ironed on" with the soldering iron, after having been coated with lard oil so that the iron will slide over the surface without scratching. On account of the springy nature of brass sheet it is never "soldered on" like the silver, as it is liable to come off while being heated over the open fire.

As far as German silver, bronze, or other alloys are concerned, the method of using them for close-plating is exactly similar to that of brass and identical in every way.

Among the uses to which close-plating is applied may be mentioned door knobs, and door plates, lamps and similar goods. The greatest consumption, however, is in carriage and harness hardware, for which close-plating is particularly fitted on account of the tough, thick film of metal that may be put on. A good close-plate is not expensive and is satisfactory from every standpoint. Were it not, the fierce competition of electro-plate would long since have driven it from the field.

ARTIFICIAL PUMICE STONE.

Large quantities of pumice stone are used in the electro-plating and silversmithing industries, as well as for the polishing, at some stage, of all metals. It is a very valuable adjunct, and does not seem to have any substitute. Pumice stone is of volcanic origin, and like all natural products greatly varies in quality. At times it does not appear to be possible to obtain the exact quality required for certain classes of work and with the eruption of Mont Pelee it was believed that, as awful as the calamity was, some good might come of it and suitable pumice stone produced. Whether this has actually taken place is doubted, but apparently our German friends have the same difficulties as we for they have begun the manufacture of artificial pumice. They say that natural pumice stone is "very unreliable both in grain and in hardness."

According to our consul at Coburg, Germany, the factory of Herr Schumacher, at Bietigheim, in the valley of the Enz, has begun the manufacture of artificial pumice stone from ground sandstone and clay and that he has adapted his product to the requirements. Ten different grades are manufactured, so that every case may be suited.

This artificial pumice stone is said to be of the same composition as the natural product, and as artificial products are usually much more uniform than those produced by nature, the plating and polishing trades may greatly profit by the manufacture of this product.

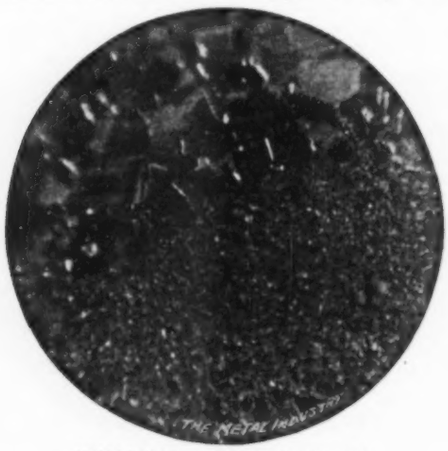
ROLLED VS. CAST ANODES.

The advantage of using a rolled anode is on account of its uniformity of texture (homogeneity.) There are no other reasons and this in itself is sufficient to warrant the use. When it dissolves in the plating bath all portions dissolve evenly and at the end of the operation the metal which remains is yet a sheet, but very thin. In the silver industry only rolled anodes are used and at the end of their life the thickness often approaches that of thin paper without any particles or portions dropping off.

A cast anode is not homogeneous, especially when cast in sand, and it dissolves away very unevenly. The corrosion is so uneven that large portions fall away long before the anode is consumed. In many establishments where cast nickel anodes are used it is customary to cover the anode with a muslin bag to avoid portions falling into the vat. At a large electrolytic copper refinery so much difficulty was caused by portions of the cast copper anodes dropping off and short circuiting the current, that a rolling mill was installed for the purpose of rolling the copper into sheet before it was used.

ABNORMAL STRUCTURE OF CARTRIDGE BRASS.

A correspondent of the *Iron and Steel Metallurgist* has sent a photomicrograph of a piece of cartridge brass which, he says, was taken in Dum Dum, India, and which shows an abnormal structure. The composition of the brass is said to be, copper, 70 per cent. and zinc 30 per cent. The contrast between the two types of crystals is very



ABNORMAL CARTRIDGE BRASS.

marked and apparently indicates that the metal was "burned" during the annealing. He says that in other instances he has found streams of fine crystals running through clusters of large ones and of a "coppery" color. When etched these streams develop pits and present a spongy appearance.

The photograph of the cartridge brass with the abnormal structure is herewith reproduced.

POISONOUS FUMES AT NICKEL WORKS.

A case of poisoning by inhalation of nickel fumes has recently been brought to notice and, as far as known, is the first case of the kind that has ever been recorded. The poisoning took place at the Mond Nickel Works, Clydach, England, where the nickel is separated from copper by means of carbon monoxide gas. By this process the nickel is changed to a gas (nickel-carbonyl) and often escapes. It was this gas which caused the death of the workman. As this was the first recorded case of poisoning by nickel fumes the physicians who were called in attendance were much perplexed, as no method of treating such poisoning was known.

Pure sheet nickel may now be obtained on the market in a condition which makes it capable of being spun, stamped or drawn; in fact, some excellent examples of spun nickel work were recently brought to our notice. It is believed that nearly everything may be done with such nickel that can be accomplished with sheet brass. The advantages of nickel for difficult requirements needs no explanation. The use of this metal, however, is somewhat retarded on account of lack of knowledge as to where it may be obtained. It is not manufactured in this country.

Copper scale is the copper oxide which scales off in annealing copper sheet, rod, or wire. The best quality of this material finds its way into the manufacture of copper paint for marine use and oftentimes, if the demand is brisk, brings the price of Lake copper. Under these considerations the material is an actual gain to the copper manufacturer, as pure scale only contains between 80 and 90 per cent. of copper. It was formerly thrown away.

EXTRUDED METAL.

Extruded metal is one of the new varieties of brass which has recently made its appearance upon the market. It is made by forcing red-hot brass through various shaped dies by hydraulic pressure. The process is patented and is known as the Dick extrusion process. It is often spoken of as the "squirting" process, as such it really is. The method is followed in the case of lead pipe, only this, of course, is done cold. It is obvious that the extrusion process can only be used on brass which will work hot and ordinary brass does not come within this requirement. Brass containing more than about 62 per cent. of copper will not work hot, but crumbles to pieces. Indeed, 62 per cent. is about on the "ragged edge" of hot working mixtures. In the extrusion machine, however, another extreme is made use of, that of the hot working mixtures which will not work cold. Mixtures containing less than 60 per cent. of copper are not considered to be workable by cold methods, although the "ragged edge" in this case seems to lie about 58 per cent. copper. The mixtures between 50 and 60 per cent. of copper, however, are quite strong and stiff and the extrusion metal makers have taken advantage of the fact that brass within these limits will roll hot and are now making an alloy containing 55 per cent. of copper and 45 per cent. of zinc. The United States Arsenal at Watertown, Mass., has recently made tests* of angle bars of this composition made by the extrusion process and obtained the following results:

Size.	Elastic Limit.	T. S. Sq. in.	Elongation in 3 in.	Cont. Area.
1.342x.182 in.	35,660 lbs.	75,000 lbs	12.3%	12.7%
1.341x.180 in.	34,440 lbs.	61,000 lbs.	3.7%	11.3%

Analysis.

Copper	54.05%
Zinc	45.77%

NIGHT CASTING.

Metal poured at night, especially for rolling mill work, often results in poor castings. The heat of metal is judged by the eye alone, and in darkness the temperature appears much higher than it really is. Plates for rolling, therefore, are cast at too low a temperature, and will be "spilly." In the brass foundry the castings will be found to have chilled before having completely filled the mold. To make uniform castings a constant light is required, and one extreme is as treacherous as another, for sunlight striking directly upon the metal will deceive the caster. In connection with night casting it may be said that the installation of "night-gangs" in the casting shop has often resulted in the production of much poor metal. To obtain the best results the caster should become accustomed to one kind of light.

According to United States Consul Halstead, acetylene is being used at Birmingham, England, for welding or burning together of different metals. He states that an intense heat is produced sufficient for the burning together of any of the common metals in the same manner that lead is now burned. The acetylene gas is mixed with oxygen in a special form of blowpipe and burns with a blue flame. It is said that quartz may be easily melted in this flame.

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*Tests of Metals—1902.

THE STRONGEST COPPER ALLOY.

The strongest non-ferrous alloy known at the present time is one which consists of

	Per Cent.
Copper	63.33
Nickel	33.33
Aluminum	3.34

This alloy actually approaches spring steel in quality as it is quite resilient and hard. The color is like that of nickel, a steel gray, and the alloy is quite non-corrosive, not quite equal to that of pure nickel, but far superior to that of the highest grades of German silver. In this respect, however, it seems to be the most non-corrosive of all the copper alloys.

In cutting, this alloy behaves more like a steel than a copper alloy, as it readily takes the edge from any cutting tool. To be sure it may be machined, but not with the facility that brass or even machinery steel is.

When cast in green sand the following results were obtained on a bar 1 in. in diameter and 12 inches long. The bar was turned down.

Diameter	0.863 in.
Breaking strain	51,400 lbs.
Breaking strain per sq. in.	88,000 lbs.
Elongation in 8 in.	0.75 per cent.

When cast in a chill mold as high as 96,000 lbs. per sq. in. has been obtained.

To make this alloy only the purest material should be used and the copper and nickel melted together under borax and charcoal for a flux. Add about 3 lbs. of borax to 100 lbs. of metal. Put the copper and nickel in the crucible together, add the borax and then some charcoal and when the metal begins to melt add a couple of handfuls of common salt to a No. 70 crucible. When thoroughly melted (nickel melts with great difficulty) add the aluminum and stir with a plumbago stirrer. Now pour into ingots or bars, but do not use for castings, as good results will not be obtained on this melt. The best castings are obtained on the second melt. If, in pouring into ingots after mixing, the tops of the ingots swell instead of shrink, do not be afraid to use the metal, as the next time it is used no swelling will take place.

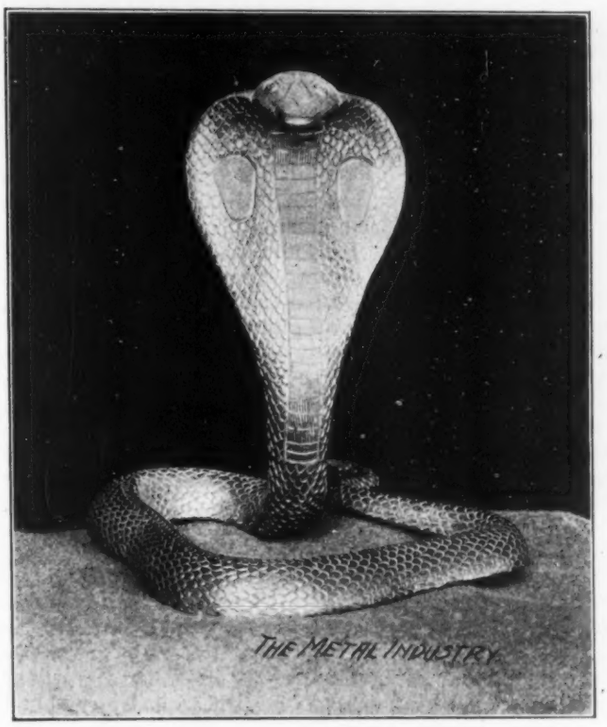
The writer has made large quantities of this alloy and finds it far superior to the alloys of a similar nature containing zinc. This alloy seems to show little tendency to crack in the casting, probably on account of the absence of zinc, and, although it melts at a somewhat high temperature, and, therefore, must be poured very hot, the metal runs very freely and fills every part of the casting. The experience of the writer has been confined to the making of small castings from it and with it has had much better results than with the so-called aluminum silver alloy or that containing copper, nickel, zinc and aluminum. The latter manifests great tendency to crack and appears to be quite red-short.

For the production of non-corrosive castings in which a metal is desired which approaches that of spring steel this alloy is recommended. The results obtained by it are certainly surprising.

A new flux for uniting steel and copper has been patented by W. H. Wherry, of Cleveland, O. The flux consists of a mixture of red phosphorus (which does not ignite as readily as yellow phosphorus) and muriatic acid and is claimed to give good results in uniting copper rail bonds to steel rails.

BENARES BRASS.

The East Indian workmen are very adept in the working of sheet metals, and examples of such work have been shown in our journal in previous issues. These native artizans are very patient and painstaking in their work and as their labor is worth but little compared with that of our own country, the work turned out is, compared with its high standard of excellence, quite cheap. The native, however, does not confine his labor to the production of sheet metal work entirely, but occasionally turns his attention to brass casting. The work of this description seems to come mainly from the city of Benares, and examples of brass work of this kind are called *Benares Brass.* An example of this kind of brass



BRASS COBRA.

casting is herewith illustrated. It is quite natural that the cobra, so prevalent in India, should be taken as one of the examples.

This casting is made of yellow brass and the following analysis was made of it, viz:

	Per Cent.
Copper	62.65
Zinc	36.33
Lead	.67
Iron	.19
Tin	.11
Antimony	Trace
Aluminum	None

Inasmuch as this casting contained so much zinc and the surface was so clean, it was suspected that aluminum had been used, but none was found. The analysis seems to indicate that the casting was made from scrap metal.

Ordinary brass cannot be worked hot, as it will crack to pieces. In order to make a mixture which will roll hot, the amount of spelter must be increased until the proportions become six parts of copper and four of spelter. This mixture is known as yellow, or Muntz, metal.

COMPOSITION.

If a person attempts to find in the various books, dictionaries, or encyclopedias, the ingredients of the common copper alloy known as "Composition," he will find his search fruitless. Although the most common alloy of copper used in the sand casting industry and a name with which all brass founders and users of metals are familiar, its exact composition is rarely known.

In the scrap metal business "Composition" is known as anything that is red metal, and all kinds of chips, no matter what the ingredients, are known as "Composition" chips. In the brass foundry, however, there is a distinction, and in this industry "Composition" is known as the cheapest copper alloy which is red. The chief requirement is that it shall be red or of a reddish tint and answer the purpose of ordinary castings. The others are that it shall be stiff enough to hold its shape under the work of machining and that it shall cut freely.

It is essential for a cheap red metal that as much zinc shall be used as possible. When more than 15 per cent. of zinc is added to copper the color begins to become yellow. Indeed, 15 per cent. forms the dividing line, and the color of this alloy (85 per cent. copper and 15 per cent. zinc) is scarcely red, but more of an orange. To make a good "Composition," therefore, it is not good practice to add more than 10 per cent. of zinc. Now an alloy of 90 per cent. of copper and 10 per cent. of zinc is too soft for ordinary use and requires a little tin to harden it. The addition of about 3 per cent. of tin gives a good alloy sufficiently stiff for ordinary purposes. But copper, zinc, and tin form an alloy which is too tough to cut freely, as the chips are long and stringy. Lead, therefore, must be added to render the metal free cutting. An addition of 2 per cent. is all that is required, although much of the scrap "Composition" contains more. Too much lead, however, is apt to sweat out and bother about dipping or finishing and 2 per cent. will give a good free cutting alloy.

An alloy, then, made after this formula is called "Composition," and although the ingredients may be varied to suit the case, it will be found that the majority of the metal on the market approaches it. It may be said that for a good red metal, one which is cheap and gives good castings and turns freely, that this alloy cannot be improved.

To make the alloy the following proportions may be used, viz.:

Copper	10	lbs.
Zinc	1¼	lbs.
Tin	6	oz.
Lead	4	oz.

or, if the maker prefers, the following may be substituted, viz.:

Copper	85	lbs.
Zinc	10	lbs.
Tin	3	lbs.
Lead	2	lbs.

Both these proportions give the same mixture.

SOME ALUMINUM ALLOYS AND THEIR USES.

With ordinary care it is possible to make aluminum alloys of strength equal to cast iron or steel, and at a cost so that the castings are no more expensive than brass, with a weight of from .42 to .47 of that allow when cast. Tensile strength would be about 35,000 per square inch, and specific gravity 3.4 to 3.8, as against 8.1 for cast brass, 7.2 for cast iron, or 7.8 for cast steel.

The two which are most useful would probably be composed of two-thirds aluminum and one-third zinc which is much like cast iron in structure and strength and aluminum three-quarters and zinc one-quarter, which has a grain somewhat like cast steel, while being more malleable than the other. Both melt at under 900 degrees Fahr., and for this reason are easy to handle, and, in fact, can be melted on a forge or other fire where no great heat need be made.

Taking aluminum at 50 cents per pound and zinc at 5 cents, the first alloy would cost 34.5 cents per pound, and the second 38.5 cents per pound, roughly, and taking brass at 16 cents per pound, the first would cost 15 cents and the second about the same for a casting weighing 1 pound in brass. Assuming the cost to be the same as brass, however, we gain both in lightness and strength, but we lose on the amount of heat the alloy will bear.

A softer alloy, which will draw into wire, is formed of 85 per cent. aluminum and 15 per cent. of zinc, but this would have a more limited use, although for soft tubing it would be excellent. All three of the alloys named take a good polish, and could be used for any purpose where strength was required free from heat.

A good alloy, which will draw into cycle and other hard tubing, and which has a better tensile strength than purely zinc-aluminum alloys, is composed of 65 per cent. aluminum, 30 per cent. zinc and 5 per cent. copper. Whether it tires and becomes granular the writer has not ascertained, but certainly on the face of it this appears to be good.

In casting these alloys the molds should not be too tightly rammed, and they should be well vented, and cores should be as soft as possible and really well vented, a handy thing to use for core venting being Gibbs & Co.'s "wax wire," which melts in the core oven and leaves the air passage open and perfect.

Although aluminum and such alloys as have been mentioned cast best in dry sand molds, yet they do very well in new green sand, and if the patterns are smooth, and the molds dressed over with steatite or plumbago, smoothed with a soft brush and not sleeked with a tool, quite smooth castings are obtainable.

There is care required in melting, which should be done under granulated charcoal, for although it is desirable that the metal shall be fluid it is of great importance that overheating should not occur, owing to the loss of metal which this causes. Re-heating also is to be avoided as far as possible, as this also causes loss, and it is well to melt only enough for each pouring.

At the same time the alloys should be mixed and poured into bars or small ingots and remelted for pouring, as this ensures a proper mixture of the metals, but beyond this no general melting is necessary, or even desirable. For making alloys, an ordinary brass furnace and plumbago crucibles will be required, and good foundry coke, as free from sulphur as possible, should be used, as with this fuel a better regulation of the heat can be secured. It is well to use covers to the crucibles, and to coat the stirring rods with plumbago, as the metals, whether alloyed or not, have a strong affinity for iron.—W. J. May, Practical Engineer.

A report of the United States Geological Survey gives the production of aluminum in the United States during 1902—7,300,000 pounds, compared with 7,150,000 pounds in 1901.

SILVER HALF-BREEDS.

All copper contains more or less silver, and the electrolytic process of refining has made it possible to separate the latter from the former, and gold obtained from the impure copper used more than pays for the cost of refining. The electrolytic refining process, however, is now almost exclusively confined to impure ores, and very little is done on the Lake Superior ores for the reason that they do not contain sufficient silver and gold to pay for working them in this manner. In fact, the copper is fully as pure (being in the metallic state) when it comes from the ground as it is after it has been melted and refined.

Lake Superior ingot copper, however, contains silver in an amount generally supposed to be from 15 to 20 ounces to the ton, but in the ore there is no regular amount, as the following remarks will indicate: Lake copper is invariably found in the metallic state and associated with more or less rock (gangue). After the rock has been removed the copper is melted and treated in the usual manner.

There is occasionally found with the copper pieces of nearly pure silver, sometimes alone, but usually connected with the copper itself. Oftentimes part of a piece will be

SPECIMENS OF SILVER HALF-BREEDS.

silver and the other copper, possessing the appearance of having separated in Nature's cooling process. Again, the piece will be nearly pure silver. Such nuggets of silver are called *Half-Breeds* by the natives of the Lake Superior region, and the name is quite obvious. The miners usually appropriate these half-breeds and sell them to the local jewelers, who, in turn, dispose of them to silver refiners. While the traffic in them is not large, it amounts to quite a sum in the course of a year.

Visitors to the Lake Superior copper regions usually bring back specimens of half-breeds as souvenirs, and very pretty ones they are too. Visitors to the stamp mills and ore dumps often succeed in finding specimens themselves, but very few good specimens escape the eagle eye of the miner. Specimens are herewith reproduced from a photograph of some half-breeds obtained from the Quincy mine at Hancock, Mich., and sold to jewelers in Houghton, from whom they were obtained. The second one from the left is a true half-breed, as the color will show. Part of the piece is copper and the remainder silver.

As might be suspected, the nuggets which appear to consist of silver are not pure, but contain some copper. The following silver assays made will demonstrate this. These assays were made on eleven samples, viz.:

Number of sample	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.
Silver fineness	835	10	873	888	937	790

Number of sample	No. 7.	No. 8.	No. 9.	No. 10.	No. 11.
Silver fineness	777	861	805	763	840

These results indicate that the fineness runs from about 700 to 900 parts of fine silver per thousand. The balance is principally copper.

The Lake Superior copper region will always be a place of attraction to any one interested in metals, and the half-breeds will always remain as wonderful results of Nature's handiwork.

JAPANESE BRONZE.

A variety of bronze called "Japanese Bronze" has made its appearance upon the market in the shape of ornamental castings. The color is a rather pleasing one and is of a somewhat lighter tint than ordinary bronze. An analysis was made of it with the following results, viz.:

Copper	83.41%
Zinc	11.93%
Tin	2.55%
Lead	2.11%

The castings are given a deep dip, which produces a pleasing finish.

In the production of copper or steel enamelled ware when a metal finish is desired on the surface of the article it has been difficult to keep the metal from scaling at the time the enamel is baked. To obviate this difficulty C. R. Manning, of Meriden, Conn., in a recent patent first plates the article with nickel, a metal which does not scale in heating and so produces a perfectly smooth surface from which the nickel may be readily removed by polishing, and a perfect surface left. If this is not done, a rough surface is left on account of the scaling and much labor is required in producing a polished surface.

Another new metal called "Nodium" has been discovered by a French engineer. It is manufactured by the electric process and is said to have the lustre of steel. The specific gravity is 2.4 and the cost 15 cents per lb. Among the few uses mentioned for this metal are torpedo boats, locomotives, motor cars, air ships, battle ships and "sky scrapers." This list reminds one of the early days of aluminum manufacture.

A new flux for soldering aluminum has been invented by Carleton Ellis and Owen J. Flannigan, of Boston, Mass., and consists of chloride of silver incorporated with a paraffine oil or a heavy grease like vaseline. When used with the solder the heat causes the aluminum and chloride of silver to react, reducing the chloride to metallic silver which attaches itself firmly to the aluminum. There is then no difficulty in obtaining a good joint between the solder and coating of silver.

In brass casting the function of the oil burning at the mouth of the mold is to reduce any oxide before it enters and produce clean castings. Unless the metal is at a suitable temperature the oil does not appear to act and this oxide entering the mold produces "spills." Metal poured at too low a temperature will not be as good as that poured at a higher one and the so-called "hot-poured" metal will invariably be found the cleaner. It is better to lose the spelter than the customer.

DETROIT COPPER AND BRASS ROLLING MILLS.

A short time ago a rumor was in circulation that The Detroit Copper and Brass Rolling Mills, of Detroit, Mich., had been absorbed by The American Brass Company, of Waterbury, Conn., and in response to various inquiries the Detroit Company have sent out the following circular:

"Several weeks ago an article of considerable length appeared in the Sunday edition of the Waterbury, Conn., Herald, extracts from which appeared in several New York dailies, in which the inference was very strong that the American Brass Company, frequently referred to as "the Trust," was negotiating with this company with a view of purchasing its plant and business. This article was published without our authority, directly or indirectly, and although without any foundation in fact, we thought it inadvisable at the time to take any official notice of it. As it appears, however, that unscrupulous salesmen in the employ of our competitors are endeavoring to make use of the article to our disadvantage by statements to the effect that we are about to be absorbed by the Trust, permit us to assure you that such statements are absolutely untrue, and that this Company has never, directly or indirectly, negotiated in any manner whatsoever with the American Brass Company with such a purpose in view, and has no thought of so doing. On the contrary, we are constantly increasing our facilities for the manufacture of Brass and Copper goods, having recently made large additions to our Sheet, Wire and Brazed Tube Departments and completed our new Seamless Tube Mills, and our policy will continue to be one of independence and progress—certainly, if we are accorded in the future the same measure of loyalty on the part of the purchasing trade as is evidenced by the past in our success, and for which we take this opportunity of returning our thanks."

The Iron Clad Manufacturing Company, with a factory in Brooklyn and a salesroom in New York, report last year to have been the most successful in their history. Their principal work is galvanized ware, but they have put in their own brass foundry, that they may make suitable mixtures required for the high pressure used in soda fountain fittings. Strange to say, The Iron Clad Manufacturing Company is owned and operated by the newspaper correspondent, "Nellie Bly," now Mrs. Seaman. Since she took charge of the business the output has been doubled and new and improved machinery installed. Mrs. Seaman is said to be the only woman in the world owning and managing a manufacturing plant of such a size.

Two metal houses which suffered from the great Baltimore fire were Clendenin Brothers and Lyon, Conklin & Co. Clendenin Brothers lost their warehouses containing a stock of pig metal, and also their offices and packing houses. Their mill and factory escaped destruction. They manufacture soldering coppers, copper hammers, copper rivets and bars, copper nails and tacks, and all kinds of store copper and brass tacks. The warehouses, offices and manufacturing plant of Lyon, Conklin & Co. were destroyed. The firm have secured temporary quarters in the Y. M. C. A building. The company deal in sheet copper, sheet lead, solder, pig tin, etc.

Oberlin Smith, president of the Ferracute Machine Company, Bridgeton, N. J., is paying particular attention to the subject of equipping the company's new plant. High speed tools and other modern appliances will be installed. The machine shop of the new works will be of fireproof construction, 100x200 feet, and the other buildings will include a pattern shop, a forge shop and an office building to be built of slow-burning construction.

Temporary repairs have been made in the burnt portion of the factory of E. W. Bliss Company, Brooklyn, N. Y., and the plant is in operation. It is estimated that the loss will be between $400,000 and $500,000. The sixth floor of their building was completely gutted by fire, and the lower floors, with their great number of machine tools, were badly damaged by water. It is the intention of the company to rebuild entirely as soon as their insurance is adjusted.

"PARTAMOL," A NEW PARTING COMPOUND.

A new compound for parting patterns from the sand molds has made its appearance on the market and is called "Partamol." This compound is the result of scientific blending of various substances so that a parting material is produced that gives results equal to lycopodium, but at a much less cost. There is nothing so exasperating in the foundry as a mold that has not parted well. To find part of the cope adhering to the nowel when it has been lifted off will make the molder as angry as any one obstacle ever encountered, as the fault lies directly in the parting compound. So much fault has been found with the various substances used for parting that many foundries have habitually used lycopodium, even with its great expense and waste. Many of the large foundries have abandoned the use of lycopodium and are now using "Partamol" with equally as good results. "Partamol" is equally as applicable to a casting made on the floor as one produced on the bench, and a trial will usually result in its use. To use "Partamol" it is simply very thinly dusted on the pattern and the sand then put on. The high specific gravity of this compound prevents the waste which takes place with lycopodium.

Mr. E. May, Room 10, 74 Beaver street, New York, has a number of samples of a German alloy called "Meteorit" in the shape of castings, sheet and wire. "Meteorit" is a mixture of aluminum and phosphorus and is now being tested by the Ordnance Department of the United States Army. German tests have stated it to have a tensile strength in the form of castings of 21,000 pounds and rolled metal 29,000 pounds. A recent test of the electrical conductivity of the alloy by Prof. Joseph W. Richards, of Bethlehem, Pa., gave "Meteorit" a conductivity of 62¼ per cent. of copper. Mr. May is forming an American company to manufacture and sell the alloy.

The Goldschmidt Thermit Company, of New York, have been incorporated under the laws of the State of New York for the purpose of exploiting in the United States the Alumino-Thermic Process, invented by Dr. Hans Goldschmidt, and protected by United States patents. The company will conduct a business in connection with the chemical and tin smelting works of Th. Goldschmidt, Essen-Ruhr, Germany, and are prepared to handle all products dealt in by the parent concern.

Wm. A. Rogers, Limited, of Niagara Falls, N. Y., has acquired the buildings recently vacated by the Carter-Crume Company, and is making extensive repairs and changes in them, practically remodelling the buildings and adding another story. The improvements will include a boiler and power house, and altogether will give the company 50,000 feet of additional floor space.

The Niagara Machine and Tool Works, of Buffalo, N. Y., offer six prizes to sheet metal workers for the best suggestions of new tools. The first prize is $50.00 in cash; the second, a 30-inch Excelsior squaring shears; third, a 30-inch Keystone bar folder; fourth, a No. 2 Waugh's Circle Shears, and fifth and sixth prizes, six medium sized Buffalo or Niagara snips.

On the back of a calendar card issued by the Empire Wire Company, of New York, is printed a table giving the ayerage monthly price of copper every year since 1883. The highest price reported is 18½ cents, from May to September, 1899; the lowest 9⅛ cents, in August, 1894.

The Damascus Bronze Company, Allegheny, Pa., have bought adjoining property to the site of their present plant in South avenue, and will enlarge their foundry. When the additions have been completed the company's plant will have a frontage of 125 feet and a depth of 180.

The way of great racing yachts is to the junk heap. The aluminum plates of "Shamrock I.," amounting to several tons, were offered for sale during the past month by M. Lissberger & Son, of New York, and found ready purchasers.

CORRESPONDENCE DEPARTMENT

In this Department we will answer any question relating to the non-ferrous metals and alloys. Address THE METAL INDUSTRY, 61 Beekman St., New York

Q.—We are requested to give a good formula for an alloy to be used for blast furnace tuyeres.

A.—There are several requisites for an alloy to be used for blast furnace tuyeres which must be carefully considered.

1.—It must be a good conductor of heat.
2.—Its melting point must be as high as possible.
3.—It should not be red-short.
4.—It must cast well in sand.

Pure copper, of course, is the ideal metal, but it is open to several objections. It is difficult to make sound castings from it and the metal is too soft for any machining to be done upon it. If desired, good castings may be made from copper by the use of 2 lbs. of silicon copper to 100 lbs. of pure copper, but good foundry practice is absolutely necessary to obtain good results. The method of making pure copper castings by the use of silicon is described in THE METAL INDUSTRY, January, 1903.

A good formula for a blast furnace tuyere consists of Copper, 94 lbs.; Tin, 5 lbs., and Manganese Copper (20 per cent), 1 lb. The tin imparts strength to the copper, while the manganese renders the alloy capable of being cast in sand without unsoundness and also prevents it from becoming red-short. If too soft, more tin may be added to the alloy, while more tin will make the metal harder. If the tin is increased or decreased the manganese should remain the same. Use no lead at all in the alloy nor any zinc. Only good copper and tin should be used.

Q.—A nickel plater asks us for a method for using the broken and scrap ends of nickel anodes and also one for the recovery of the black oxide and metallic grains which form on the surface of an anode while it is dissolving in the plating bath.

A.—Nickel anode scrap is only suitable for melting into new anodes. If a suitable furnace is at hand this may be done by any one who is versed in the art of melting metals, but a very high heat is required, fully equal to that necessary for melting steel. It is far better and, indeed, much more profitable for small lots, to sell them to some metal dealer or anode maker. A reputable dealer will give you good prices for them. If you desire to melt them, however, the usual brass founders' furnace may be used, but must be supplied with a blast in order to attain the necessary temperature. Melt in a plumbago crucible and cover the nickel with a small quantity of borax for a flux. When melted add a small quantity of aluminum (about 1 oz. to 100 lb.), in order to make the metal run well, and then cast in sand in the same manner as brass or iron.

The black oxide which forms on the surface of an anode contains some iron, but is mainly nickel. This cannot be profitably melted, but may be sold to nickel smelters. It does not seem to be iron scale, as you suggest, but is mainly metal, as it is magnetic. Iron scale is oxide of iron. A recent analysis of the deposit on a nickel anode showed it to contain some 15 per cent of iron and the balance nickel. Whether the iron exists in the metallic state we cannot say, but the greater part of the dried deposit was attracted by the magnet which would seem to indicate that it does exist in the metallic condition. Nickel, of course, is magnetic, while oxide of iron is not.

Q.—Referring to our recent suggestion that cyanide of potash makes an excellent flux, we have been asked about the poisonous qualities of this substance in connection with its use in the brass foundry.

A.—Cyanide of potash is the most violent poison known and its use is invariably attended with danger. Every plating establishment uses it in large quantities and it has always been a surprise to us that more cases of poisoning have not taken place. We have used cyanide ourselves in the brass foundry for a flux with excellent results, and in this connection will say that the *fumes from melted cyanide* do not appear to be deleterious to any extent, as the volatilized substance seems to break up when it reaches the air. We have used it for some time and have never noticed any bad results in this connection. Its poisonous qualities are the most violent when taken into the stomach and it is not poisonous to the skin when handled. Tons of cyanide are used in the mining industry, and if care is used no bad results should follow in the brass foundry.

Q.—The formula for the cheapest grade of babbitt metal sold on the market is desired. This metal is usually known as No. 4 babbitt metal, or hardware babbitt.

A.—This alloy is composed of lead and antimony and contains no tin at all. It is not made from the separate metals, lead and antimony, but from antimonial lead, a by-product in the smelting and refining of silver. This antimonial lead contains about 20 per cent. of antimony and 80 per cent. of lead and the hardness is about right for use as a babbitt metal. If the commercial antimonial lead is found to be too hard it may be remelted with a little pure lead to soften it. Antimonial lead may be purchased from the various metal dealers and is very much cheaper than the same alloy made from pure lead and antimony, but is not as good on account of the presence of impurities. Nearly all anti-friction metals are made from antimonial lead as the sharp competition in these materials will not allow pure materials to be used at a profit. There are good and poor grades of antimonial lead on the market and discretion should be used in the selection of the material. Antimonial lead is also called hard lead. It sells for a slightly higher price than pure lead.

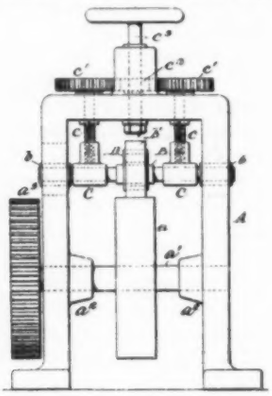
Q.—A brass founder and finisher wishes to have us furnish him with a dipping formula for removing the dark color from brass castings made from machinery scrap. He says that with new metal he has been successful with a dip composed of two parts of nitric acid and one part of sulphuric acid to which a small quantity of common salt has been added.

A.—We are afraid that you will not be successful with any dip for the purpose that you want. The trouble with brass castings made from machinery scrap is that they contain a large amount of lead which renders it impossible to dip them bright, no matter what dip is used. Castings containing a small amount of lead, say two per cent, will dip bright, but you do not know how much lead is in your scrap. You are not cognizant of the fact that it may have been melted many times and that each time some one may have added lead. As far as known, there is no bright dip for lead, and it is the lead which has segregated from the parent metal that renders the dipping so troublesome.

PATENTS

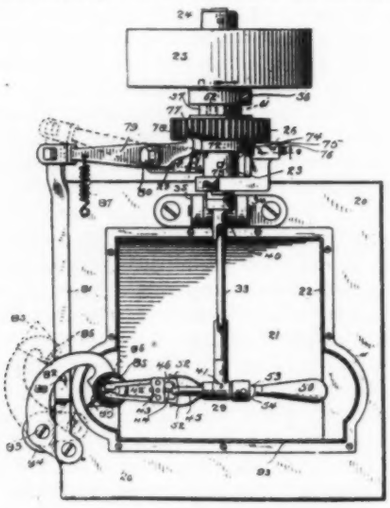
A full copy of any Patent mentioned will be furnished for Ten Cents. Address THE METAL INDUSTRY, 61 Beekman Street, New York

745,555, Dec. 1, 1903. APPARATUS FOR MAKING AND ORNAMENTING BRACELETS, RINGS, &c. Joseph Aranyi, Brooklyn, N. Y. The combination with an annular die, of a pressure-roller of uni-



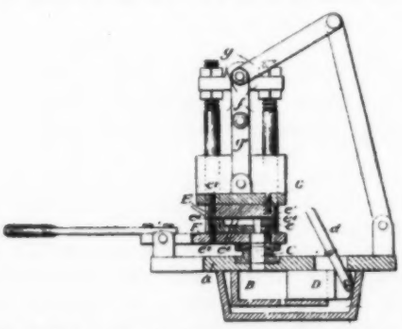
form diameter extending entirely through said die and supported at both ends, and means for operating said roller in a single axial plane, substantially as set forth.

746,000, Dec. 8, 1903. TINNING-MACHINE. Henry L. Bradley, New Haven, and Frederic W. Otis, Orange, Conn.; said Otis assignor to said Bradley. In a machine of the character described



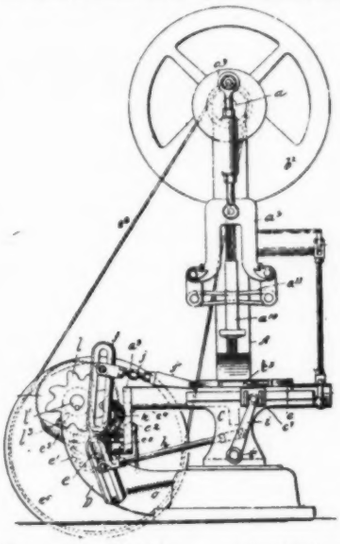
the combination with jaws for holding an article to be tinned and a shaft by which they are carried, of means for rotating the shaft whereby the jaws are whirled to remove surplus tin from the article by centrifugal force.

748,061. Dec. 29, 1903. PROCESS OF CASTING. Herbert H. Franklin, Syracuse, N. Y.—The herein-described process of casting with a sectional mold, the same consisting in supplying to the mold the material to be cast and in removing the air from



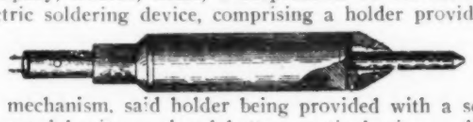
the mold through a narrow space formed by separating contiguous surfaces of sections of the mold during the entrance of the material to be cast, said space being too narrow to permit the escape of the material to be cast, substantially as and for the purpose specified.

748,722. Jan. 5, 1904. METAL-BEATING MACHINE. Francis W. Grempler, Hoboken, N. J.—In a metal-beating machine, the combination of a rotary pack-holder, reversed pawls acting upon



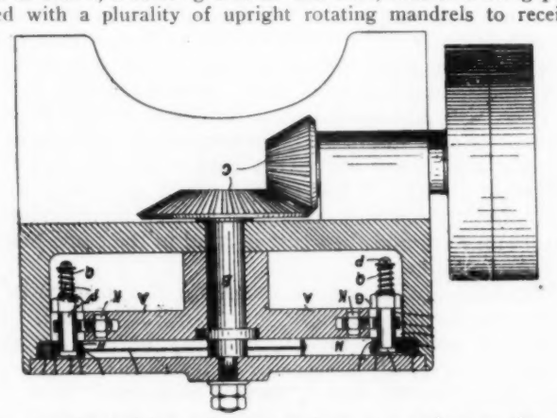
the opposite sides of said holder, a reciprocating rod simultaneously actuating said pawls and an oscillating arm with which said rod is adjustably connected, for the purposes set forth.

748,571. Jan. 5, 1904. ELECTRIC SOLDERING IRON. James I. Ayer, Cambridgeport, Mass., assignor to Simplex Electric Heating Company, Boston, Mass, a corporation of Massachusetts.—An electric soldering device, comprising a holder provided with



heating mechanism, said holder being provided with a socket at its outer end having a closed bottom, a tip having a sliding fit in said socket and adapted to contact with the entire length of the socket, and fastening means for pressing the walls of said socket against the tip on all sides of the latter.

748,982. Jan. 5, 1904. MACHINE FOR BEADING SHEET-METAL WARES. James W. Paton, Southport, and Henry G. Taylor, Egremont, England.—A machine for the purpose specified, having a shell or frame, a rotating disk in said shell, said disk being provided with a plurality of upright rotating mandrels to receive



and carry the articles to be operated on, a top plate on the said shell and covering the rotating disk, said plate fitting down quite closely to the articles on the mandrels so as to keep them in place, and said plate having in it at one point an aperture for feeding in the articles to the mandrels and at another point an aperture for the delivery of the articles after they shall have been operated on, means for feeding in one article at a time at the feeding-aperture, means for forcing the articles down upon the respective mandrels, and means, coacting with the mandrels, for operating on the articles carried by the latter.

TRADE NEWS

When You Have Any Trade News of Interest Send It to THE METAL INDUSTRY, 61 Beekman Street, New York.

The E. M. Dart Manufacturing Company, of Providence, R. I., have issued recently their new catalogue showing their brass couplings.

The Booth Manufacturing Company, of Bristol, Conn., manufacturers of metal novelties, are about to install a plating department in their works.

The Homestead Valve Manufacturing Company, of Pittsburg, Pa., report that they are making excellent brass in the new converting furnaces which they have in use.

The Columbus Brass Company, of Columbus, Ohio, issues a monthly pamphlet called "The Plumber," which advertises their products and contains hints for plumbers.

The Indian Aluminum Company, of Madras, India, have secured the sole agency of the British Aluminum Company, giving them the exclusive control of the sale of aluminum in India.

The C. F. Monroe Company, of Meriden, Conn., makers of cut glass and similar goods, are about to commence the manufacture of a line of sterling and plated wares as a fitting adjunct to their present business.

The N. Stafford Company, of New York City, have been incorporated with a capital of $50,000, to manufacture metal signs and baggage checks. The directors are: Nelson Stafford, A. N. Stafford and C. C. Beekman.

O. P. Chatfield, of Escanaba, Mich., will soon erect a new brass foundry and core oven. Mr. Chatfield also has a brass foundry at Marinette, the business of which will probably be transferred to the Escanaba plant.

Charles F. Brooker, president of The American Brass Company, of Waterbury, Conn., and The Coe Brass Company, of Torrington, Conn., has been elected vice-president of the Board of Directors of The New York, New Haven & Hartford Railroad Company.

A quarterly dividend of one and one-half per cent. has been declared by The New Haven Clock Company, of New Haven, Conn. This is the first dividend that the company has paid in ten years. Business is very brisk with this company, especially in the watch and small goods departments.

The new building of Richey, Brown & Donald, Greenpoint, Brooklyn, N. Y., architectural iron works, will be built as soon as the weather permits. The firm's plant was destroyed by fire and they are now occupying temporary quarters. They manufacture all kinds of architectural bronze work.

At the annual profit sharing of the employees of McKenna Brothers' Brass Company, Pittsburg, Pa., the amount received by each workman who had been employed throughout the year was from $50 to $70. The company have about 100 workmen, of which ten are brass molders and forty brass workers.

The Pittsburgh-Alaskan Tin Company have been incorporated at Washington, D. C., with a capital stock of $5,000,000, and will mine tin ore in Alaska. It is claimed that the immense deposits of tin ore in Alaska will result in tin becoming cheaper when the mining and smelting operations are well under way.

The Elgin National Watch Company, report that the statement that they would make improvements costing about a million dollars was grossly exaggerated. The company are making improvements in their factory costing less than $500,000, and the expenditure will be spread over a period of at least three years.

The Meeker Foundry Company, of Newark, N. J., have been incorporated recently with a capital of $250,000, to take over the business of S. J. Meeker, which H. A. Potter has been running the past six months as trustee. In addition to malleable and gray iron foundry work the company will make brass castings.

The Rockwell Engineering Company, 26 Cortlandt street, New York, have issued a catalogue describing their new rotary melting furnace for copper, brass, bronze, aluminum, etc. This furnace was described in the February issue of THE METAL INDUSTRY, and further particulars may be found in the advertising pages of this number.

The American Graphophone Company, of Bridgeport, Conn., have the installation of a foundry under consideration. This company now make all of their own aluminum castings, but buy what brass castings are consumed. The present quarters are inadequate for the increasing business, and a separate building is contemplated.

The Puritan Specialty Company, of Stamford, Conn., are now occupying the factory formerly occupied by The Blickensderfer Typewriter Company on Garden street, and are now manufacturing bath room fixtures and other nickel plated goods, as well as a line of hardware. Max J. Fuchs is president and treasurer of the company, and Arthur M. Flynn general manager.

The National Brazing & Supply Company, of Cleveland, Ohio, have opened an establishment at 23 Michigan street. Besides handling their brazing compound, known as "Eureka," the company will act as agents for gas and gasoline engines, hoisting machinery, jacks, Silvey storage batteries, electric motors, pipe-threading machines, wrenches, machinery, tools, and power hack saws.

In the circular issued by Queen & Co., Inc., of Philadelphia, Pa., the company announce that they have been in business fifty years. They manufacture mathematical and engineering instruments and have received many medals and diplomas for the excellence of their goods. The business was founded in November, 1853, by James W. Queen. J. C. Gray is now president of the corporation.

The Waterbury Battery Company, of Waterbury, Conn., have increased their capital stock from $10,000 to $50,000, and are about to build an addition to their plant. The inventions of Charles B. Schoenmehl, the president, have proven so successful that a new building is needed for the expansion of the business. Mr. Schoenmehl has recently improved his battery so that it possesses marked advantages over the former type.

The following officers of The E. H. H. Smith Silver Company, of Bridgeport, Conn., have been elected: President, E. H. H. Smith; vice-president, W. H. Browne; treasurer, E. H. H. Smith; secretary, Charles E. Francis; assistant secretary, W. H. Bullard. The officers of The E. H. H. Smith Knife Company were elected at the same time, and are identical with those of The E. H. H. Smith Silver Company. The two companies are conducted as one, and steel edge knives as well as sterling and plated flat ware are manufactured.

The American Corundum Company, recently incorporated under the laws of New York, have purchased the building formerly occupied by The Waldo Foundry at Bridgeport, Conn., and will commence the manufacture of fine grades of corundum for abrasive purposes. This company owns extensive deposits of corundum in Brazil, and which will form their source of supply. The officers of the company are Dr. A. B. Townshend, of New York City, president; B. C. Lyon, of Bridgeport, Conn., secretary and treasurer; and George F. Hardy, general manager. Operations have already commenced in the plant in the shape of machinery installation.

Kendall & Flick, Washington, D. C., have issued neat folders describing their manganese copper.

J. R. Clancy, of Syracuse, N. Y., has begun the manufacture of brass couplings for water and steam hose.

The William H. Wilkinson Company have moved into their new shops at West Medway, Mass. They manufacture oiling devices and oil cups for steam engines and other machinery.

The Unique Metal Company, of Buffalo, N. Y., have been incorporated with a capital of $10,000 to manufacture "Unique Metal," an alloy which is made for trolley wheels and bearing purposes.

The Wisconsin Brass Company, Port Washington, Wis., have filed an amendment with the State providing that the company may have branch offices at any place desired by the Board of Directors.

F. L. & J. C. Codman, Boston, Mass., manufacturers of loose and sewed buffing wheels, have recently established branch plants at Chicago, Ill., and Utica, N. Y. Later the firm may take up other lines.

In the calendar issued by The McCullough-Dalzell Crucible Company, of Pittsburgh, Pa., for the year 1904, there is a view of the company's works, which are said to be the largest crucible works in the world.

The Aluminum Manufacturing Company, of Two Rivers, Wis., report that business has picked up considerably since the holidays. Merchants seem to be out of stock, and the company have been rushed with orders.

The Phosphor Bronze Smelting Company, of Philadelphia, Pa., have cancelled and withdrawn all previous quotations for their products, and have issued a revised price list, No. 22, which contains information and prices about all forms of phosphor bronze.

The Cowles Electric Smelting & Aluminum Company, of Lockport, N. Y., have issued a price list of pure aluminum in ingots, sheets, rods and wire, and which they are prepared to ship in any quantity. They also sell aluminum alloys, silicon alloys and manganese alloys.

The Wolverine Brass Works, Grand Rapids, Mich., have increased their capital stock from $75,000 to $150,000. The increase in capital has been taken up by the present stockholders, and the officers do not expect to make any large additions to their plant at the present time.

At the annual meeting of The Eaton, Cole & Burnham Company, Bridgeport, Conn., the following officers were elected: E. G. Burnham, president; W. E. Burnham, vice-president; E. H. Cole, treasurer; William H. Douglas, secretary, and W. E. Burnham, assistant treasurer.

The Kokomo Brass Works, Kokomo, Ind., have been incorporated with a capital stock of $10.000. The company have been in business for several years, and manufacture all kinds of goods in brass, bronze and aluminum. They also do nickel plating and make automobile accessories.

The Maine Valve Company, of Skowhegan, Me., have been incorporated with a capital stock of $10,000. The company have been organized primarily to handle a metal to metal ball cock; also other valves where their patent cock can be applied. The company will manufacture brass valves.

The Robinson Automatic Machine Company, Detroit, Mich., have been incorporated with a capital stock of $50,000, absorbing the Robinson Automatic Polishing Machine Company. The company are organized for the purpose of manufacturing and selling the Robinson automatic polishing machine suitable for the buffing of brass tubing, etc.

The Spencer Wire Company have bought the business of the Globe Staple Company, Providence, R. I., and have moved the machinery to their Worcester mill. The new business will be conducted as a separate department, and the line is principally for drapery and upholstery goods. The Spencer Wire Company expect to gradually increase it.

The Standard Metal Furniture Company, of Detroit, Mich., have been incorporated with a capital stock of $325,000, to manufacture brass and iron beds, particularly a special folding bed, patented by V. J. Gillett. Later on the company hope to erect a large factory for the purpose of carrying on their business. At present their specialties are being manufactured for them.

At the annual meeting of The American Tool Works Company, Cincinnati, Ohio, the following officers were elected: Franklin Alter, president; J. B. Doan, vice-president and general manager, and Harry Luers, secretary and treasurer. The stockholders were well pleased with last year's showing. The officers state the machine tool trade has been rather dull since the first of the year.

The Harbison-Walker Refractories Company, of Pittsburgh, Pa., makers of high-grade fire clay and silica brick for smelting furnaces, have recently elected the following officers: S. C. Walker, president; H. W. Croft, first vice-president; J. B. Cullom, second vice-president; Hamilton Stewart, secretary and treasurer; F. H. Wigton, third vice-president; G. W. Reese, fourth vice-president.

At the annual meeting of the New England Watch Company, Waterbury, Conn., held February 9, the officers elected were: George L. White, president; Edward L. Frisbie, Jr., vice-president; A. O. Jennings, secretary and treasurer; C. B. Churchill, assistant secretary, and Charles S. Chapman, assistant treasurer. Mr. Frisbie declined a re-election as president, because of his inability to give the necessary time to the office.

The International Manufacturing Company, of Columbus, Ohio, have taken over the Hallwood Cash Register Company, of the same city. The new company have a capital stock of $3,750,000, and will manufacture a new register door lock and computing scale, as well as the Hallwood line of cash registers. An addition to the present factory will be built at once and the sale of the Hallwood register is to be pushed more than ever. The company expects to do an extensive foreign business.

The A. C. Stiles Metal Company, of New Haven, Conn., have been incorporated with a capital of $100,000, for the purpose of manufacturing The A. C. Stiles self-oiling driving journal bearing for locomotives and other heavy machinery; also patent car journal bearings, babbitt metal and all kinds of castings for heavy also make a specialty of heavy bearings for rolling mills. The incorporators are: Isaac J. Wild, Harrison G. Wagner, and Richard W. Meigs.

The Babbitt-Richards Company, of Clayville, N. Y., have changed their name to the Babbitt-Harris Company, and have elected the following officers: Walter Harris, president; J. L. Babbitt, vice-president; B. T. Babbitt, secretary and treasurer, and Albert Harris, superintendent. The new company report that they will maintain the high standard of excellence of the old company. Their specialty is fine wire in any metal, including copper, brass, bronze, German silver, fourdrinier and brush makers' wire.

FOR SALE CHEAP.—The large size HILL CINDER AND ORE GRINDER, suitable for cleaning skimmings and ashes. D. CANFIELD, 196 Newark street, Newark, N. J.

WANTED—Position as *Foundry Foreman*. Have had twelve years' experience in brass and aluminum work. Can give references. Address WORK, THE METAL INDUSTRY.

WANTED.—Back numbers of THE METAL INDUSTRY. We desire copies of January, February, March and April, 1903. Any of our readers sending us these copies we will extend their subscription two months for each copy.

Metal Prices, March 1, 1904

METALS

	Price per lb.
TIN—Duty Free.	
Straits of Malaca	28.37
COPPER, PIG, BAR AND INGOT AND OLD COPPER—Duty Free. Manufactured 2½c. per lb.	
Lake	12.50
Electrolytic	12.35
Casting	12.25
SPELTER—Duty 1c. per lb.	
Western	5.00
LEAD—Duty Pigs, Bars and Old 2⅛c. per lb.; pipe and sheets 2½c. per lb.	
Pig Lead	4.50
ALUMINUM—Duty Crude, 8c. per lb. Plates, sheets, bars and rods 13c. per lb.	
Small lots	37.00
100 lb. lots	35.00
1,000 lb. lots	34.00
Ton lots	33.00
ANTIMONY—Duty ¾c. per lb.	
Cooksons	8.25
Halletts	7.00
Other	6.25
NICKEL—Duty 6c. per lb.	
Large lots	40 to 50
Small lots	50 to 75
BISMUTH—Duty Free	$1.50 to $2.00
PHOSPHORUS—Duty 18c. per lb.	
Large lots	45
Small lots	65 to 75
	Price per oz.
SILVER—Duty Free—Commercial Bars	$0.58
PLATINUM—Duty Free	19.00
GOLD—Duty Free	20.00
QUICKSILVER—Duty 7c. per lb. Price per Flask	47.50

Sheet Lead, 7¾c. per lb., 20 per cent. off.
Lead Pipe, 6¾c. per lb., 20 per cent. off.
Zinc—Duty, Sheet, 2c. per lb.; 600-lb. casks, 7.00c. per lb., open, 7.50c. per lb.
Tobin Bronze—Rods, Unfinished, 19c.
Tobin Bronze—Rods, Finished, 20c.

PRICE FOR ALUMINUM BRONZE INGOTS.

	Per pound.
2½ per cent	19c.
5 per cent	19½c.
7½ per cent	20½c.
10 per cent	21½c.

Manganese Bronze, Ingots 16½c.
Phosphor Bronze, Ingots 15 to 18c.
Silicon-Copper, Ingots 34 to 36c.

OLD METALS

	Buying.	Selling.
Heavy Cut Copper	10.50c.	12.00c.
Copper Wire	10.25c.	11.25c.
Light Copper	9.25c.	10.00c.
Heavy Mach. Comp	9.50c.	10.50c.
Heavy Brass	7.25c.	8.25c.
Light Brass	5.50c.	6.50c.
No. 1 Yellow Brass Turnings	6.50c.	7.25c.
No. 1 Comp. Turnings	8.00c.	9.00c.
Heavy Lead	4.10c.	4.30c.
Zinc scrap	3.75c.	4.00c.
Scrap Aluminum, sheet, pure	22.00c.	25.00c.
Scrap Aluminum, cast, alloyed	16.00c.	20.00c.
Old Nickel	15.00c.	25.00c.

PRICES OF SHEET COPPER

SIZES OF SHEETS.		96oz. & over 75 lb. sheet 30x60 and heavier	64oz. to 96oz. 50 to 75 lb. sheet 30x60	32oz. to 64oz. 25 to 50 lb. sheet 30x60	24oz. to 32oz. 18¾ to 25 lb. sheet 30x60	16oz. to 24oz. 12½ to 18¾ lb. sheet 30x60	14oz. and 15oz. 11 to 12½ lb sheet 30x60
		CENTS PER POUND.					
Not wider than 30 ins.	Not longer than 72 ins.	18	19	19	19	19	20
	Longer than 72 ins. Not longer than 96 ins.	18	19	19	19	19	20
	Longer than 96 ins.	18	19	19	19	19	21
Wider than 30 ins. but not wider than 36 ins.	Not longer than 72 ins.	18	19	19	19	19	21
	Longer than 72 ins. Not longer than 96 ins.	18	19	19	19	19	21
	Longer than 96 ins. Not longer than 120 ins.	18	19	19	19	20	22
	Longer than 120 ins	18	19	19	20	21	
Wider than 36 ins. but not wider than 48 ins.	Not longer than 72 ins.	18	19	19	20	21	23
	Longer than 72 ins. Not longer than 96 ins.	18	19	19	20	22	24
	Longer than 96 ins. Not longer than 120 ins.	18	19	19	21	23	27
	Longer than 120 ins.	18	19	20	22	25	
Wider than 48 ins. but not wider than 60 ins.	Not longer than 72 ins.	18	19	19	20	22	25
	Longer than 72 ins. Not longer than 96 ins.	18	19	19	21	23	28
	Longer than 96 ins. Not longer than 120 ins.	18	19	20	22	25	
	Longer than 120 ins	19	20	21	23	27	
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 ins.	18	19	20	22	27	
	Longer than 96 ins. Not longer than 120 ins.	18	19	21	24	29	
	Longer than 120 ins.	19	20	22	27		
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 ins.	19	20	22	25		
	Longer than 96 ins. Not longer than 120 ins.	20	21	23	26		
	Longer than 120 ins.	21	22	24	28		
Wider than 108 ins.	Not longer than 132 ins.	22	23	25			
	Longer than 132 ins.	23	24	27			

Rolled Round Copper, ⅜ inch diameter or over, 21 cents per pound. (Cold Drawn, Square and Special Shapes, extra.)

Circles, Segments and Pattern Sheets three (3) cents per pound advance over prices of Sheet Copper required to cut them from.

All Cold or Hard Rolled Copper, 14 ounces per square foot and heavier, one (1) cent per pound over the foregoing prices.

All Cold or Hard Rolled Copper, lighter than 14 ounces per square foot, two (2) cents per pound over the foregoing prices.

Cold Rolled and Annealed Copper, Sheets and Circles, wider than 17 inches, take the same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

All Polished Copper, 20 inches wide and under, one (1) cent per pound advance over the price for Cold Rolled Copper.

All Polished Copper, over 20 inches wide, two (2) cents per pound advance over the price for Cold Rolled Copper.

Planished Copper, one (1) cent per pound more than Polished Copper.

Cold Rolled Copper prepared suitable for polishing, same prices and extras as Polished Copper.

Tinning Sheets, on one side, 2½c. per square foot.
For tinning both sides, double the above price.
For tinning the edge of sheets, one or both sides, price shall be the same as for tinning all of one side of the specified sheet.

Metal Prices, March 1, 1904

COPPER BOTTOMS, PITS AND FLATS

Net Cash Prices.

14 oz. to square foot, and heavier, per lb	23c.
Lighter than 10 oz	24c.
10 oz. and up to 12 oz	26c.
12 oz. and up to 14 oz. to square foot, per lb	29c.

Circles less than 8 in diam., 2c. per lb. additional.
Circles over 13 in. diam., are not classed as Copper Bottoms.
Polished Copper Bottoms and Flats, 1c. per lb. extra.

PRICE LIST FOR ROLL AND SHEET BRASS

Prices are for 100 lbs. or more of sheet metal in one order. Brown & Sharpe's Gauge the Standard.

Common High Brass	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
Wider than and including	2 12	12 14	14 16	16 18	18 20	20 22	22 24	24 26	26 28	28 30
To No. 20 inclusive..	.22	.23	.25	.27	.29	.31	.33	.36	.39	.42
Nos. 21, 22, 23 and 24	.22	.24	.26	.28	.30	.32	.34	.37	.40	.43
Nos. 25 and 26	.23	.24½	.27	.29	.31	.33	.35	.38	.41	.44
Nos. 27 and 28	.23	.25	.28	.30	.32	.34	.36	.39	.42	.45

Add ½ cent per lb. additional for each number thinner than Nos. 28 to 38, inclusive.

Add 7 cents per lb. for sheets cut to particular lengths, not sawed, of proportionate width.

Add for polishing on one side, 40 cents per square foot; on both sides, double this price.

Brazing, Spinning and Spring Brass, 1 cent more than Common High Brass.

Extra Quality Brazing, Spinning and Spring Brass, 2 cents more than Common High Brass.

Low Brass, 4 cents per lb. more than Common High Brass.

Gilding, Rich Gold Medal and Bronze, 7 cents per lb. more than Common High Brass.

Discount from List, 30 per cent.

PRICE LIST FOR BRASS AND COPPER WIRE

BROWN & SHARPE'S GAUGE THE STANDARD.	Com. High Brass	Low Brass	Gilding Bronze and Copper
All Nos. to No. 10, Inc	$0.23	$0.27	$0.31
Above No. 10 to No. 16	.23½	.27½	.31½
Nos. 17 and 18	.24	.28	.32
" 19 and 20	.25	.29	.33
No. 21	.26	.30	.34
" 22	.27	.31	.35
" 23	.28	.32	.36
" 24	.30	.34	.38

Discount, Brass Wire, 30 per cent.; Copper Wire, 40 per cent.

PRICES FOR SEAMLESS BRASS TUBING

From 2 in. to 3¼ in. O. D. Nos. 4 to 12 Stubs Gauge, 19c. per lb. Seamless Copper Tubing, 22c. per lb.

For other sizes see Manufacturer's List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron Pipe size	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb	33	29	20	19	18	18	18	18	18	18	18	20	20	22	24	25

BRAZED BRASS TUBING

Brown & Sharpe's Gauge the Standard.

												Per lb
Plain	Round	Tube,	¾	in.,	up	to	2	in.,	to No.	19,	inc.	$0 35
"	"	"	⅞	"	"		2¼	"	"	19,	"	36
"	"	"	1	"	"		2½	"	"	19,	"	38
"	"	"	1⅛	"	"		2⅞	"	"	19,	"	41
"	"	"	1¼	"	"		3	"	"	19,	"	48
"	"	"	1½	"	"		3½	"	"	19,	"	65
"	"	"	1¾	"	"		4	"	"	19,	"	1 06
"	"	"	2	"	"		4¼	"	"	19,	"	1 50
Smaller than ¼ inch												Special
2 inch to 3 inch, to No. 19, inclusive												38
3 inch												40
Over 3 inch to 3½ inch												45
Over 3½ inch												50

Bronze and copper advance 3 cents. Discount 30 per cent.

PRICE LIST FOR SHEET ALUMINUM

PLATE AND SHEET PRICE LIST.—B. & S. GAUGE.

Prices are for 50 pounds or more at a time. Less quantities, 5 cents per pound additional. Charges made for boxing.

Wider Than.. And Including..	*8 in. 12 in. in coils.	6 in. 14 in.	14 in. 16 in.	16 in. 18 in.	18 in. 20 in.	20 in. 24 in.	24 in. 30 in.	30 in. 36 in.	36 in. 40 in.	40 in. 45 in.	45 in. 50 in.	50 in. 55 in.	55 in. 60 in.	Polishing One Side.	Sat. Fin. without Lacquer. One Side.
No. 13 & heavier		42	44	44	44	44	47	47	47	48	48	49	50	2	6
" 14		43	44	44	44	44	47	47	47	48	48	49	50	2	6
" 15		43	44	44	44	44	47	47	47	48	48	49	50	2	6
" 16		43	44	44	44	44	47	47	47	48	48	49	50	2	6
" 17		43	44	44	44	44	47	47	47	48	48	49	50	2	6
" 18		43	44	44	44	44	47	47	47	48	48	49	50	2	6
" 19		43	44	44	44	44	47	47	47	48	48	49	50	2	6
" 20		43	44	44	44	44	47	47	47	48	48	49	50	2	6
" 21		43	44	44	44	44	47	47	47	48	48	49	50	2	6
" 22		43	44	44	44	44	47	47	47	48	48	49	50	2	6
" 23		43	44	44	44	44	47	47	47	48	48	49	50	2	6
" 24		43	44	44	44	44	47	47	47	48	48	49	50	2	6
" 25		43	44	44	44	44	47	47	47	48	48	49	50	2	6
" 26		43	44	44	44	44	47	47	47	48	48	49	50	2	6
" 27		43	44	44	44	44	47	47	47	48	48	49	50	2	6
" 28		43	44	44	44	44	47	47	47	48	48	49	50	2	6
" 29		43	44	44	44	44	47	47	47	48	48	49	50	2	6
" 30		43	44	44	44	44	47	47	47	48	48	49	50	2	6
" 31		43	44	44	44	44	47	47	47	48	48	49	50	2	6
" 32		43	44	44	44	44	47	47	47	48	48	49	50	2	6
" 33		43	44	44	44	44	47	47	47	48	48	49	50	2	6
" 34		43	44	44	44	44	47	47	47	48	48	49	50	2	6
" 35 & 36	1 67	43	44	44	44	44	47	47	47	48	48	49	50	2	6
" 37 & 38	1 58	43	44	44	44	44	47	47	47	48	48	49	50	2	6
" 39 & 40	1 33	43	44	44	44	44	47	47	47	48	48	49	50	2	6
".008" to .0015"	2 33	43	44	44	44	44	47	47	47	48	48	49	50	2	6
Less than .0015"	2 66	43	44	44	44	44	47	47	47	48	48	49	50	2	6

Not wider than 6 in.

Additional charge for slitting coiled sheet in widths less than 3 in. and flat rolled sheets in widths less than 6 in. All columns except the first are for Flat Rolled Sheets.

Polished two sides double above prices.

Satin Finish two sides double above prices.

Discounts as follows are given for sheet orders over 200 pounds.

200 to 1,000 pounds				10	per cent. off list.
1,000 to 2,000	"	10	per cent. and	2	" "
2,000 to 4,000	"	10	" "	3	" "
4,000 pounds and over		10	" "	5	" "

Sheets polished or satin-finished on both sides, double the price for one side.

Price Per Foot of Seamless Aluminum Tubing.

(CHARGES MADE FOR BOXING.)

THICKNESS OF WALL IN STUBS' GAUGE.

Outside Diameter in Inches.	No. 12.	No. 14.	No. 16.	No. 18.	No. 20.	No. 22.	No. 24.	Outside Diameter in Inches.
1-4	.....	.....	.....	10	9	8	7	1-4
5-16	.....	.....	.....	11	9	8	7	5-16
3-8	.....	.....	.....	12	9	8	7	.....3 8
1-2	.....	.....	17	14	11	9	8	..... 1 2
5-8	.....	.....	21	16	13	12	.....	5-8
3-4	.....	.....	25	19	16	14	.....	3-4
7-8	.....	.....	28	22	18	16	.....	7-8
1	.....	.....	30	25	21	19	.....	.....1 00
1 1-4	.....	.....	36	30	25	.....	.....	.....1 1 4
1 1-2	.....	52	43	35	28	.....	.....	.....1 1-2
1 3-4	.....	60	50	41	33	.....	.....	..... 1 3 4
2	84	68	58	47	37	.....	.....	.....2 00

Discount 20 to 30 per cent.

ALUMINUM

Drawn Rod and Wire Price List.—B. & S. Gauge.

Diameter B. & S. G'ge.	0000 to No. 10	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price per lb	$ 38	38½	38½	0 39	39½	0 40	40½	0 41	0 42	0 43	0 44	0 47	0 52

200 lbs. to 30,000 lbs., three cents off list.
30,000 lbs. and over, four cents off list.

Additional charge for slitting coiled sheet in widths less than 3 in. and flat rolled sheets in widths less than 6 in.
All columns except the first are for Flat Rolled Sheets.